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(54) **Blunt cannula for accessing a slit septum**

Stumpfe Kanüle für den Zugang zu einer Scheidewand

Canule à bout arrondi pour accéder à une membrane fendue

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(73) Proprietor: **Smiths Medical ASD, Inc.**
Rockland, MA 02370-1136 (US)

(72) Inventors:
- **Baxter, Charles S.**
Worthington, OH 43085 (US)
- **Gallogly, Dale Marvin**
Mount Vernon, OH 43050 (US)
- **Mosler, Theodore J.**
Raleigh, NC 27616 (US)
- **Patzer, Charles R.**
Columbus, OH 43228 (US)

(74) Representative: **Findlay, Alice Rosemary et al**
Reddie & Grose LLP
The White Chapel Building
10 Whitechapel High Street
London E1 8QS (GB)

(56) References cited:
WO-A-91/19462
US-A- 5 135 489
US-A- 5 188 593
US-A- 5 322 516
US-A- 5 833 674
US-A1- 2004 220 542
US-A1- 2004 254 541
US-B1- 6 706 023

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Description

[0001] The present invention relates to medical devices in the form of blunt cannulas used to access a slit septum and adaptors having blunt cannulas to access slit septums of medical sites, such as sample sites or injection sites. In another aspect, the present invention relates to a sample site.

[0002] Sample sites and injections sites typically comprise a plastic housing with one or more ports for fluid ingress or egress relative to the interior cavity of the housing. The housing also typically has a cylindrical portion defining a large aperture adjacent the cavity but which is closed off by a solid septum. A sharp needle may be inserted through the material of the septum to bring the distal opening of the needle at the sharp tip into communication with fluid within the housing to facilitate fluid flow through the lumen of the needle. To reduce needle-stick risks, the needle is contained within a shroud that is generally sized and shaped to prevent fingers from touching the needle tip. The shroud fits over the cylindrical portion of the housing as the needle extends into and through the septum into the cavity. In some arrangements, the shroud may also include slots positioned and sized to fit over the port(s) of the housing, and further may be shaped, such as to define a J-shape, so as to be rotatable relative to the port(s) to lock the shroud to the site.

[0003] In an effort to reduce or eliminate needles, the solid septum is replaced with a slit septum through which a blunt cannula is to be inserted. Typically, the blunt cannula may form part of an adaptor having luer mating structure to connect with the luer structure of a standard medical device, such as a syringe by way of example, in order to fluidicly couple into the site cavity via the central lumen of the blunt cannula. The blunt cannula typically has an upper or proximal circular cross-section cylindrical portion, and a lower or distal portion that tapers to a tip, with the tip defining or including a distal opening for fluid flow relative to the central lumen of the blunt cannula. It has been proposed to control the taper of the distal portion so that it is gradual and uniform between the proximal portion and the tip, which uniform taper is said to reduce insertion forces necessary to insert the cannula through the slit. Also, the proximal portion is intended to be a cylinder without any significant taper, other than perhaps a nominal taper due to draft in the molding process, to reduce the tendency for kick back of the cannula (i.e., the septum material and cannula surface interacting in a manner which would urge the cannula back out of the slit) when the cannula is inserted far enough into the slit to reach the proximal portion of the cannula as is typically desired.

[0004] There are various drawbacks with these blunt cannulas. By way of example, the slit may not seal against the proximal portion of the cannula extending therein, thus creating an area for possible fluid leakage. Further, some of the tip ends of the blunt cannula have been found to be quite sharp. While that "sharp" end allows the cannula to make initial entry into the slit, a shroud is still necessary therewith to prevent finger-touching of the tip as was done with the sharp needles these blunt cannula were intended to replace. Alternatively, the tip end or surface of the cannula may be flat and so is desirably blunt rather than sharp. But the flat end can impede initial entry of the cannula into the slit.

[0005] US 5135489 discloses a medical device in the form of a blunt cannula comprising a proximal portion and a distal portion terminating in a tip end, a central lumen extending through the proximal portion and into the distal portion, and at least one fluid opening communicating through an aspect of the distal portion with the central lumen.

[0006] WO 91/19462 discloses a universal connector capable of both connection with female luer connectors and penetration of resealable-diaphragm connection sites. The connector comprises a tubular member defining a first tubular section having a distal end capable of resealably penetrating a latex resealable-diaphragm injection site. Aperture means are provided adjacent the distal end of the tubular member for communication with the lumen of the tubular member with the exterior.

[0007] The present invention provides a medical device in the form of a blunt cannula comprising an elongated, tubular member, the member having a proximal portion extending distally from a proximal end and a distal portion extending distally from the proximal portion and terminating in a rounded tip end, a central lumen extending through the proximal portion and into the distal portion , and at least one fluid opening communicating through an aspect of the distal portion with the central lumen, characterized in that the distal portion has a non-uniform taper proximal the tip end defined by a plurality of tapered segments located proximally of the rounded tip end and having different tapers, the plurality of tapered segments each progressively closer to the rounded tip end and each adjacent to and contiguous with at least one other segment, at least one of the tapered segments having a conical taper and at east another of the tapered segments having an arcuate taper.

[0008] In accordance with a preferred embodiment, the distal portion of the blunt cannula presents a rounded tip end or surface, which may be solid, and a plurality of tapered segments having different tapers extending between the proximal portion and the tip end. The differently-tapered segments present a non-uniformly tapering distal portion which is believed to provide the advantage of reduced insertion forces, but without the disadvantage of a tip end that is so sharp as to have need for a protective shroud nor so flat as to impede entry into the septum silt.

[0009] Advantageously, there are four differently-tapered segments (by type and/or size). The four segments may alternate between conical and arcuate tapers. A first tapered segment adjacent the proximal portion may extend with a conical taper, followed by a second tapered segment having a generally arcuate taper with a radius of curvature. A third tapered segment may extend with a

conical taper, which may advantageously be greater than the conical taper of the
first tapered segment, and a fourth tapered segment may lead into the solid, rounded tip and may have a generally arcuate taper with a radius of curvature less than that of the second segment.

[0010] In accordance with a further preferred embodiment, the central lumen of the blunt cannula extends distally through the proximal portion and only partially into the distal portion. Advantageously, the central lumen does not extend into the distal portion so far as to reach the solid, rounded tip end and further advantageously not so far as to reach even the lowermost tapered segment. To that end, some aspect of the tapered segment adjacent the tip (or that entire segment and possibly some aspect of the next, proximally adjacent segment) is solid. The fluid opening(s) of the distal portion coupling to the central lumen pass through one or more of the tapered segments, excluding the solid aspect(s) of the tapered segment. As a result, the fluid path to and from the central lumen via the fluid opening(s) advantageously will not extend into or through the tip so as not to interfere with the solid, rounded tip. A groove(s) may extend distally from the fluid opening(s) along some or all of the solid aspect(s) of the tapered segments toward, but not necessarily all the way, to the tip end. The fluid opening(s) may also extend through aspects of the proximal portion of the blunt cannula, particularly the aspect thereof closely adjacent to the distal portion of the blunt cannula.

[0011] The proximal portion of the blunt cannula may have a non-circular cross-section instead of a circular cross-section. This has been found to enhance the seal between the septum slit and the blunt cannula during use. Advantageously, the proximal portion is not a cylinder. In that regard, the cross-section of the proximal portion, at least along a substantial length thereof, is generally oval and tapers distally such that the major diameter of the oval cross-section decreases therealong to merge into the first tapered portion of the distal portion. It is believed that the shape created upon opening of the slit is not circular. The shaping of the proximal portion to have a generally oval cross-section is thus believed to afford a more complete seal between the surfaces of the slit and the blunt cannula during use. Yet, while the tapering of the major diameter of the proximal portion, along with the non-uniform taper of the distal portion, results in a blunt cannula that has a significant taper along substantially its entire length, it is believed that kickback is not problematic.

[0012] In a further embodiment there is provided an adaptor to be used with a medical site, for example. In that regard, the medical site may be a sample site with oppositely disposed fluid ports extending from a central housing containing the septum to define a T-shape to the medical site. With such a T-shaped construction, fluid flows between the ports and across the septum. The central housing may be cylindrical, and support the septum at the top thereof adjacent the flow path. The adaptor has a plate with luer mating structure, such as a male luer lock, associated with one surface thereof and the blunt cannula extending from the opposite surface thereof with the central lumen of the cannula in fluid communication with the luer mating structure. Depending from opposite edges of the plate to either side of the blunt cannula is a pair of oppositely disposed, generally flat guide walls. The guide walls may have lateral edges extending into the area below the intermediate edges of the plate. Advantageously, the cannula may be spaced equidistant from the two guide walls. Further advantageously, the guide walls are spaced apart a distance approximating the diameter of the central housing such that the guide walls and housing cooperate to align the tip of the cannula with the slit of the septum for proper insertion therewith. One br more of the outboard or lateral edges of the guide walls may be provided with a rib aimed toward the blunt cannula and which further cooperates to align the blunt cannula to the slit.

[0013] The flat guide walls may be spaced apart enough to provide a distal mouth that is large enough not to preclude finger touching. The lateral edges of the flat guide walls may extend into the area below the intermediate edges of the plate sufficient to define a gap that conforms to the width of the port(s) so as to reduce the likelihood of rotation of the adaptor relative to the housing with the cannula inserted into the septum. While the guide walls could be shaped and positioned differently to provide a shroud and/or the ability to lock same to the site, it is not believed necessary to do so with the blunt cannula of the present invention and/or the adaptor containing same.

[0014] The outboard walls of the housing between the ports of the medical site could be generally flat rather than arcuate, such as by thickening the plastic thereat. The generally flat sides of the housing would cooperate with the generally flat guide walls to further enhance alignment and/or resist rotation. Advantageously, one or more of the lateral edges of the flat side walls of the housing define a groove edge to receive the rib(s) of the guide walls therealong to still further enhance alignment and/or resist rotation.

[0015] Where the proximal portion of the blunt cannula has a generally oval-cross-section, the cannula is advantageously inserted into the slit with the major diameter of the generally oval cross-section proximal portion aligned with the slit. To that end, the septum is generally affixed to the site housing aperture with the slit in a fixed orientation relative to the flow path between the ports. The blunt cannula and guide walls of the adaptor are fixed in relationship such that the major diameter of the proximal portion of the blunt cannula extends at an orientation thereto corresponding to the orientation of the slit of the septum relative to the fluid ports. Advantageously, the slit orientation may be transverse to that flow path, in which case the blunt cannula is oriented in the adaptor with the major diameter transverse to the guide walls (i.e., with the minor diameter thereof parallel to the guide

walls). The gap(s) between the lateral edges of the guide walls and/or the interaction of the rib(s) of the adaptor and the groove edge(s) of the site housing resist rotation of the blunt cannula aligned into the slit.

[0016] By virtue of the foregoing, there is thus provided an improved blunt cannula design with a uniquely shaped distal portion so as not to require a tip that is either essentially sharp or flat while advantageously reducing insertion resistance. There is thus also provided an improved blunt cannula design with a uniquely shaped proximal portion by which to enhance the seal between the septum slit and the blunt cannula during use. There is further also provided an adaptor which preferably includes the improved blunt cannula design(s) for use in accessing the slit septum of medical sites. There is still further provided a medical site configured to advantageously mate with the adaptor. These and other objects and advantages of the present invention shall be made apparent from the accompanying drawings and the description thereof.

[0017] The invention will now be described by way of example with reference to the accompanying drawings in which:

Fig. 1 is a front elevation view of a medical device in the form of a blunt cannula in accordance with the present invention;

Fig. 2 is a cross-sectional view of the blunt cannula of Fig. 1 taken along line 2-2;

Fig. 3 is a top or proximal plan view of the blunt cannula taken of Fig. 1;

Fig. 4 is a bottom or distal plan elevation view of the blunt cannula of Fig. 1;

Figs. 5A and 5B are a partial perspective views of the blunt cannula of Fig. 1 and a slit septum showing the blunt cannula out of and within the slit, respectively;

Fig. 6 is a side elevation view of a medical device in the form of an adaptor including the blunt cannula of Fig. 1 in accordance with the present invention;

Fig. 7 is a top plan view of the adaptor of Fig. 6;

Fig. 8 is bottom perspective view of the adaptor of Fig. 6;

Fig. 9 is a perspective view of one embodiment of a medical device in the form of a sample site for use the with the adaptor of Fig. 6 in accordance with the present invention;

Fig. 10 is a cross-sectional view of the sample site of Fig. 9 taken along line 10-10;

Fig. 11 is a transverse cross-sectional view of the sample site of Fig. 9 with the adapator of Fig. 6 mounted thereon;

Fig. 12 is a perspective view of another embodiment of a medical device in the form of a sample site for use with the adaptor of Fig. 1 in accordance with the present invention; and

Fig. 13 is a transverse cross-sectional view of the sample site of Fig. 12 with the adaptor of Fig. 6 mounted thereon.

[0018] With reference to Figs. 1 through 4, there is shown an embodiment of a medical device in the form of a blunt cannula 10. Cannula 10 includes a proximal or upper portion 12 and a distal or lower portion 14, the latter terminating in a tip segment 16 including a rounded tip end or surface 18. In accordance with one aspect of the present invention, the distal portion 14 is tapered non-uniformly. To that end, distal portion 14 includes a plurality of tapered segments 22, 24, 26, 28 each progressively closer to tip end 18 and each having a different taper as will be described hereinafter. First tapered segment 22 is adjacent proximal portion 12, second tapered segment 24 is adjacent first tapered segment 22, third tapered segment 26 is adjacent second tapered segment, and fourth tapered segment 28 is adjacent third tapered segment and tip segment 16 so as to be closer to tip end 18 than tapered segments 22, 24, or 26.

[0019] Advantageously, the tapered segments 22, 24, 26, 28 alternate between conical and arcuate tapers. To that end, first and third tapered segments 22, 26 have conical tapers and second and fourth tapered segments 24, 28 have arcuate tapers. The taper of the third tapered segment 26 is advantageously larger than that of the first tapered segment 22. By way of example, the taper of the first tapered segment 22 may be about 1° while that of the third tapered segment may be about 5°. The arcuate tapers of the second and fourth tapered segments 24 and 28 may also differ, with the radius of curvature of the latter smaller than that of the former. To that end, the radius of curvature of the second tapered segment 24 may be about 1/4 inch (0.635 cm) while that of the fourth tapered segment may be slightly greater than 1/16 inch (0.159 cm). The tip segment 16 may have a radius of about 1/36 inch (0.278 mm) to define rounded end 18.

[0020] In accordance with a further feature of the present invention, the proximal portion 12 advantageously has a non-circular cross-section such as an oval cross section as seen particularly in Figs. 3, 4, 5A, and 5B. The proximal portion 12 may taper from its upper end 30 and opening 31 thereat toward the distal portion 14 such that the major diameter (D_{MAJ}) thereof decreases to facilitate merger of the proximal and distal portions 12, 14. The minor diameter (D_{MIN}) of the proximal portion 12 may also taper along its length if desired.

[0021] A fluid lumen 36 extends centrally from the upper end opening 31 of cannula 10 through proximal portion 12 and partially into distal portion 14, but terminates as at 38 spaced away from tip end 18. Advantageously, lumen 36 extends through the first and second tapered segments 22, 24 but only partially into third tapered segment 26, such that the rest 40 of tapered segment 26, and all of fourth tapered segment 28 and tip segment 16 are solid. Fluid communication is established with central lumen 36 via one or more fluid openings 44 extending through an aspect of proximal portion 12 as at 45 and the portions of first, second and third tapered segments

22, 24, 26 coextensive with lumen 36, excluding the solid portion 40 of tapered segment 26 and all of solid tapered segment 28 and solid tip segment 16, such that the fluid path to and from the central lumen 36 via the fluid opening 44 does not extend into or through tip end 18. As shown in Fig. 4, there may be three fluid openings 44 circumferentially and equidistantly spaced about cannula 10. Fluid openings 44 each communicate with a respective groove 46 extending from lumen 36 at 38, distally along solid aspect 40 of tapered segment 26 and solid segment 28 formed in the solid aspects thereof. Each groove 46 may also extend partially along solid tip segment 16, but the grooves 46 advantageously do not extend so far into the material of cannula 10 as to reach all the way to tip end 18 (as exemplified by the area 48 in Fig. 2).

[0022] With reference to Fig. 5A, there is shown a perspective view of the blunt cannula 10 and a septum 50 held by a rigid structure 51 and having a slit 52. Septum 50 is held in position by structure 51 so as to close off an aperture 53 to a fluid path as at 54 below septum 50. Cannula 10 js oriented relative to slit 52 such that the major diameter (D_{MAJ}) of cannula proximal portion 12 is aligned therewith. In use, blunt cannula is inserted into slit 52 with tip end 18 impacting against septum 50 thereat to begin to open slit 52. The distal portion 12 enters into slit 52 with what is believed to be acceptably low insertion forces until proximal portion 12 resides within slit 52 and fluid opening(s) 44 are in the fluid path 54 as seen in Fig. 5B. It is believed that slit 52 does not normally open into a circular shape but instead more of a shape compatible with an oval such that with proximal portion 12 aligned and extending therein as seen in Fig. 5B, an effective seal is achieved with blunt cannula 10 thereat. End 30 may be coupled to or integrally formed with other structure for fluidic communication with lumen 36 via opening 31, such as a male or female luer lock, a syringe end, or other medical fluid connections.

[0023] The tapering of proximal and distal portions 12 and 14 presents a significant taper along substantially the entire length of cannula 10, but it is believed that with the foregoing arrangement, kickback is not problematic.

[0024] In accordance with yet another feature of the present invention, there is provided a mdeidcal device in the form of an adaptor 60 for accessing a medical site 62 (Fig. 9) which may include the blunt cannula with the non-circular cross-section proximal portion 12 and/or the non-uniform tapered distal portion 14. To that end, and as shown in Figs. 6 through 8, adaptor 60 includes a plate 64 having an upper surface 66 with which is associated luer mating structure such as a male luer lock 68, and a lower surface 70 with which a blunt cannula, such as cannula 10, is associated. Plate 64 includes oppositely disposed edges 72, 74 extending between surfaces 66 and 70 and from which extend a pair of generally flat guide walls 76, 78. Walls 76, 78 are to either side of blunt cannula 10 and may extend distally slightly past tip end 18, but may be spaced far enough apart to define a distal mouth 80 that is large enough not to preclude a finger from touching blunt cannula 10, and particularly tip end 18 thereof. Advantageously, walls 76, 68 may be spaced equidistant from cannula 10 such that cannula 10 is in the center of adaptor 60. Central lumen 36 of cannula 10 fluidically couples into the luer cavity 82 of male luer lock 68 as at opening 84 coupled to opening 31 of cannula 10 as best shown in Fig. 6.

[0025] Guide walls 76, 78 have lateral edges as at 85, one or more of which may be provided with a rib 86 along a radial of the centerline of cannula 10 so as to be aimed toward cannula 10. Further, lateral edges 85 may extend as at 87 into the area 90 below the intermediate edges 92, 94 of plate 64, but if they do so extend, may advantageously form a gap 96 therebetween.

[0026] The adaptor 60 may be used with a medical site such as a sample site 62 shown in Figs. 9, 10, and 11. To that end, sample site 62 has a central, cylindrical and circular cross-section housing 102 with oppositely disposed ports 104 extending therefrom to define a T-shape to site 62 (Fig. 9). Fluid normally flows (as at 54) between ports 104 and through cavity 106 within housing 102 and may be as shown in U.S. Patent No. 5,221,271. Housing 102 includes an aperture 108 adjacent cavity 106 which is closed off by septum 50 with slit 52 thereof in a fixed orientation relative to the path of flow between ports 104, such as tangent or perpendicular thereto as shown in Fig. 9. Septum 50 may be secured in aperture 108 by a cap 110 bonded to housing 102 thereat. Adaptor 60 is sized to cooperate with sample site 62. To that end, guide walls 76, 78 are spaced apart a distance approximating the width or diameter of central housing 102 transverse to the ports 104 (see Fig. 11) so as to fit closely thereover with tip end 18 of cannula 10 aimed at slit 52. Further, cannula 10 may be held in adaptor 60 at a fixed orientation such that the major axis (D_{MAJ}) of proximal portion 12 of cannula 10 is aligned with slit 52. To that end, the major axis (D_{MAJ}) advantageously extends transversely between guide walls 76 and 78. The rib(s) 86 also help to align cannula 10 with slit 52. The gap(s) 96 are sized to receive a respective port 104 therethrough so as not to impede insertion of cannula 10 into septum 50, while also advantageously reducing the likelihood of rotation of adaptor 60 relative to housing 102.

[0027] Housing 102 may be supported on struts 120 which extend and are coupled to outboard support walls 122, each having an elongated flat portion 124 and lateral arcuate edges 126, the latter being secured to bracket 128. The flat portions 124 each define an inner surface 130 confronting housing 102 and an outer surface 136 facing away from housing 102. One or more ridges 138 are disposed on the outer surface(s) 136 of flat portion(s) 124 to facilitate gripping site 62. Ridges 138 each extend in a line in the same direction as the elongated flat portion on to which they are disposed so as not to form radially inwardly or outwardly curvatures thereof relative to housing 102.

[0028] An alternative sample site 62' is shown in Figs. 12 and 13 in which at least the outboard aspects of hous-

ing 102 between ports 104 are generally flat side walls 140 such as by thickening the plastic of housing 102 thereat. Side walls 140 matingly align with guide walls 76, 78 and further resist rotation therebetween (see Fig. 13). In the embodiment of Fig. 12, one or more of the lateral edges 142 of walls 140 define a groove edge to receive a respective rib 86 therealong to still further enhance alignment and/or resist rotation. Alternatively, or additionally, the adjacent side walls 144 could also be thickened so as to cooperate with walls 140 to define grooves 146 therebetween bounded by groove edges 142 for receiving the rib(s) 86. Also, septum 50 may be held to housing 102 by swaging the upper end of the housing thereover as at 148.

[0029] In use, ports 104 of site 62 typically are connected to tubing such as in a closed blood sampling system. The cavity 106 of site 62 may be accessed by blunt cannula 10 to withdraw fluid from cavity 106. To that end, a syringe (not shown) may be coupled to luer connector 68 and adaptor 60 is positioned with guide walls 76, 78 to either side of housing 102 and ports 104 aligned with gaps 96. The user (not shown) may grip site 62 by support walls 122 and push adaptor 60 down over housing 102 to insert cannula 10, tip end 18 first, into slit 52 with the major diameter (D_{MAJ}) of proximal portion 12 aligned with slit 52. The adaptor 60 may be pushed into place until the guide walls 76, 78 hits against struts 120 whereat portion 12 extends into slit 52 and distal portion 14 is in the cavity 106 so as to communicate with fluid path 54 extending therein as seen in Fig. 11 (or Fig. 13 when used with site 62'). Septum 50 seals to cannula 10 for withdrawal of fluid into lumen 36 (or expulsion of fluid from lumen 36 were adaptor 60 or blunt cannula 10 coupled to an injection site such as a heparin lock (not shown)). The resiliency of the elastomeric material of septum 50 about cannula 10 holds adaptor 60 in place without the need for locking structure, although such could be added or included if desired. After use, adaptor 60 is pulled off from site 62 whereupon slit 52 closes to maintain the closure of aperture 108.

Claims

1. A medical device in the form of a blunt cannula (10) comprising an elongated, tubular member, the member having a proximal portion (12) extending distally from a proximal end (30) and a distal portion (14) extending distally from the proximal portion (12) and terminating in a rounded tip end (18), a central lumen (36) extending through the proximal portion (12) and into the distal portion (14), and at least one fluid opening (44) communicating through an aspect (48) of the distal portion (14) with the central lumen (36), **characterized in that** the distal portion (14) has a non-uniform taper proximal the tip end (18) defined by a plurality of tapered segments (22, 24, 26 and/or 28) located proximally of the rounded tip end and having different tapers, the plurality of tapered segments each progressively closer to the rounded tip end (18) and each adjacent to and contiguous with at least one other segment, at least one of the tapered segments (22 or 26) having a conical taper and at least another of the tapered segments (24 or 28) having an arcuate taper.

2. A medical device as claimed in claim 1 further comprising at least one groove (46) extending along the distal portion (14) between the fluid opening (44) and the tip end (18).

3. A medical device as claimed in either claim 1 or claim 2, the tip end (18) being solid.

4. A medical device as claimed in claim 3, the central lumen (36) extending into the distal portion (14) short of the tip end (18).

5. A medical device as claimed in claim 2, or either of claims 3 and 4 when dependent on claim 2, the at least one groove (44) stopping short of the tip end (18).

6. A medical device as claimed in any preceding claim further comprising a plurality of circumferentially spaced fluid openings (44) extending into the distal portion (14) coincident with the central lumen (36) therein,

7. A medical device as claimed in claim 6 further comprising a plurality of circumferentially spaced grooves (46) extending along the distal portion (14) from a respective fluid opening (46) toward the tip end (18).

8. A medical device as claimed in any preceding claim, one of the tapered segments (26 or 28) being closer to the tip end (18) than at least another of the tapered segments (22 or 24), an aspect (40) of the one tapered segment (26 or 28) being solid, the central lumen (36) extending into the distal portion (14) short of the solid aspect (40).

9. A medical device as claimed in claim 8, the one tapered segment (28) being closer to the tip end (18) than any other of the tapered segments (22, 24, or 26), the one tapered segment (28) being completely solid, the central lumen (36) extending into the distal portion (14) short of the one tapered segment (28).

10. A medical device as claimed in any preceding claim, wherein the proximal portion (12) and the distal portion (14) of the blunt cannula (10) are tapered along substantially an entire length of the cannula (10).

11. A medical device as claimed in any preceding claim,

the distal portion (14) having a non-uniform taper defined by four tapered segments, a first segment (22) adjacent the proximal portion (12), a second segment (24) adjacent the first segment (22), a third segment (26) adjacent the second segment (24), and a fourth segment (28) adjacent the third segment (26) and closer to the tip end (18) than the other three segments (22, 24, 26).

12. A medical device as claimed in claim 11, at least an aspect of the fourth tapered segment (28) being solid.

13. A medical device as claimed in claim 12, the central lumen (36) extending into the distal portion (14) short of the solid aspect of the fourth tapered segment (28).

14. A medical device as claimed in claim 11, the fourth tapered segment (28) being solid and at least an aspect (40) of the third tapered segment (26) adjacent the fourth tapered segment (28) being solid.

15. A medical device as claimed in claim 14, the central lumen (36) extending into the distal portion (14) short of the solid aspect (40) of the third tapered segment (26).

16. A medical device as claimed in any of claims 11 through 15, the central lumen (36) extending through at least the first and second tapered segments (22, 24) of the distal portion (14).

17. A medical device as claimed in any of claims 11 through 16, the at least one fluid opening (44) extending into the distal portion (14) coincident with the central lumen (36) therein but not extending into the distal portion (14) coincident with the fourth tapered segment (24) or the tip end (18).

18. A medical device as claimed in any of claims 11 through 17, the first and third tapered segments (22, 26) being conically tapered, the conical taper of the third segment (26) being greater than the conical taper of the first segment (22).

19. A medical device as claimed in any of claims 11 through 18, the second and fourth tapered segments (24, 28) being arcuate each with a respective radius of curvature, the radius of curvature of the arcuate taper of the fourth tapered segment (28) being less than the radius of curvature of the arcuate taper of the second tapered segment (24).

20. A medical device as claimed in any preceding claim, the proximal portion (12) having a non-circular cross-section.

21. A medical device as claimed in claim 20, the proximal portion (12) having a generally oval cross-section.

22. A medical device as claimed in claim 21, the proximal portion (12) tapering toward the distal portion (14) such that the major diameter of the generally oval section decreases toward the distal portion.

23. A medical device as claimed in any of claims 1 through 21, the proximal portion (12) tapering toward the distal portion (14).

24. A medical device as claimed in any one of claims 1 to 19 in combination with a medical site (62) including a housing (102) having a flow path (54), and a septum (50) bounding a portion of the flow path, the septum having a slit (52) therein, the blunt cannula (10) insertable through the slit (52) in the septum (50), wherein the proximal portion (12) has a non-circular cross section that defines a major diameter and the slit (52) in the septum (50) is oriented so that the major diameter of the proximal portion (12) is substantially aligned to the slit (52) when the proximal portion (12) is disposed in the septum (50).

25. A medical device as claimed in claim 24, the proximal portion (12) being an oval cross-section.

26. A medical device as claimed in any one of claims 21, 24 and 25, the proximal portion (12) tapering along at least the major diameter.

27. A medical device as claimed in any of claims 20 to 22 and 24 to 26 further comprising a plate (64) having an upper surface (66) and a lower surface (70) and oppositely disposed side edges (72, 74) therebetween, the proximal portion (12) of the blunt cannula (10) associated with the lower surface (66), and a pair of guide walls (76, 78) extending from the oppositely disposed edges (72, 74) to either side of the blunt cannula (10).

28. A medical device as claimed in claim 27, the guide walls (76, 78) engaging the housing (102) of the medical site (62) so that the major diameter of the blunt cannula (10) is substantially aligned to the slit (52) in the septum (50).

29. A medical device as claimed in any of claims 1 through 19, further comprising an adaptor (60) having a plate (64) with upper and lower surfaces (66, 70) and oppositely disposed side edges (72, 74) therebetween, the blunt cannula (10) associated with the lower surface (66), the proximal portion (12) extending from the plate lower surface (66), and in combination with a medical site (62) comprising a housing (102) having a flow path (54) and a septum (50) bounding a portion of the flow path, the blunt cannula (10) insertable through the septum (50), wherein the

adaptor (60) also has a pair of generally flat guide walls (76, 78) extending from the plate side edges (72, 74) to either side of the blunt cannula (10), at least one of the guide walls (76 or 78) having a lateral edge (85) including a rib (86) running therealong and aimed at the blunt cannula (10), the housing (102) having a pair of opposed generally flat side walls (140), at least one of the side walls (140) having a lateral edge (142) defining a groove edge running therealong and oriented so that the rib (86) engages along the groove edge (142) when the blunt cannula (10) is disposed in the septum (50).

30. A medical device as claimed in any one of claims 1 to 23 in combination with a medical site (62) including a slit septum (50) for receiving the blunt cannula (10) therethrough.

31. A medical device as claimed in any one of claims 1 to 23 and 30 further comprising a plate (64) having an upper surface (66) and a lower surface (70) and oppositely disposed side edges (72, 74) therebetween, luer mating structure (68) associated with the plate upper surface (66), the proximal portion (12) of the blunt cannula (10) associated with the lower surface (70), and a pair of guide walls (76, 78) extending from the oppositely disposed edges (72, 74) to either side of the blunt cannula (10).

32. A medical device as claimed in claim 31, the guide walls (76, 78) having lateral edges (85).

33. A medical device as claimed in any one of claims 24 to 30, the medical site being a sample site (62).

34. A medical device as claimed in either claim 29 or claim 32, the plate (64) having intermediate edges (92, 94) between the side edges (72, 74), at least one of the lateral edges (85) of one of the guide walls (76) extending into an area (90) below at least one of the intermediate edges (92).

35. A medical device as claimed in claim 34, at least one of the lateral edges (85) of the other guide wall (78) extending into the area (90) and defining a gap (96) between the lateral edges (85).

36. A medical device as claimed in claim 34 or claim 35, the other lateral edge (85) of the one guide wall (76) extending into another area (90) below another of the intermediate edges (94).

37. A medical device of claim 36, the other lateral edge (85) of the other guide wall (78) extending into the other area (90) and defining a gap (96) between the other lateral edges (85).

38. A medical device as claimed in any one of claims 29, 32 and 34 further comprising a rib (86) running along at least one of the lateral edges (85).

39. A medical device as claimed in claim 38, the rib (86) being aimed at the blunt cannula (10).

40. A medical device as claimed in any one of claims 1 to 23 and 30 and claim 35 as dependent on claim 30 further comprising a plate (64) having upper and lower surfaces (66, 70), the plate (64) having four corners, luer mating structure (68) associated with the plate upper surface (66), the proximal portion (12) of the blunt cannula extending from the plate lower surface (70), wherein four ribs (86) extend from the plate lower surface (66) generally parallel to the blunt cannula (10), each associated with a respective one of the four corners of the plate (64), and each being aimed toward the blunt cannula (10).

41. A medical device as claimed in any of claims 29 and 38 to 40, each rib (86) being along a radial of a centerline of the blunt cannula (10).

42. A medical device as claimed in any one of claims 1 to 23 in combination with a medical site comprising a housing (102) having a flow path (54) and a septum (50) bounding a portion of the flow path, and a pair of spaced support walls (122) coupled to the housing (102) and configured such that the housing is disposed between the support walls to define a gap therebetween, each support wall (122) having an elongated flat portion (124) extending in a direction astride the housing such that an inner surface (130) thereof confronts the housing (102) and an outer surface (136) thereof faces away from the housing (102), and at least one elongated ridge (138) disposed on the outer surface (136) of at least one of the support walls for gripping the site, the elongated ridge (138) extending along a line in the same direction as the flat portion (124) of the support wall (122).

43. A medical site as claimed in claim 42, each of the support walls (122) including a plurality of said elongated ridges (138).

Patentansprüche

1. Medizinische Vorrichtung in Form einer stumpfen Kanüle (10), die ein längliches tubuläres Element umfasst, wobei das Element einen proximalen Abschnitt (12), der sich distal von einem proximalen Ende (30) erstreckt, und einen distalen Abschnitt (14) aufweist, der sich sich distal von dem proximalen Abschnitt (12) erstreckt und in einem Ende (18) mit abgerundeter Spitze endet, ein zentrales Lumen (36), das durch den proximalen Abschnitt (12) und in den distalen Abschnitt (14) verläuft, und wenigs-

tens eine Fluidöffnung (44), die durch einen Aspekt (38) des distalen Abschnitts (14) mit dem zentralen Lumen (36) in Verbindung ist, **dadurch gekennzeichnet**, das der distale Abschnitt (149 eine ungleichmäßige Verjüngung proximal zum spitzen Ende (18) hat, definiert durch mehrere sich verjüngende Segmente (22, 24, 26 und/oder 28), die sich proximal zu dem Ende mit abgerundeter Spitze befinden und unterschiedliche Verjüngungen haben, wobei die Mehrzahl von sich verjüngenden Segmenten jeweils progressiv näher an dem Ende (18) mit abgerundeter Spitze sind und jeweils neben und angrenzend an wenigstens ein anderes Segment sind, wobei wenigstens eines der sich verjüngenden Segmente (22 oder 26) eine konische Verjüngung hat und wenigstens ein anderes der sich verjüngenden Segmente (24 oder 28) eine bogenförmige Verjüngung hat.

2. Medizinische Vorrichtung nach Anspruch 1, die ferner wenigstens eine Nut (46) aufweist, die entlang dem distalen Abschnitt (14) zwischen der Fluidöffnung (44) und dem spitzen Ende (18) verläuft.

3. Medizinische Vorrichtung nach Anspruch 1 oder Anspruch 2, wobei das spitze Ende (18) massiv ist.

4. Medizinische Vorrichtung nach Anspruch 3, wobei das zentrale Lumen (36) in den distalen Abschnitt (14) bis kurz vor das spitze Ende (18) verläuft.

5. Medizinische Vorrichtung nach Anspruch 2 oder einem der Ansprüche 3 und 4 in Abhängigkeit von Anspruch 2, wobei die wenigstens eine Nut (44) kurz vor dem spitzen Ende (18) stoppt.

6. Medizinische Vorrichtung nach einem vorherigen Anspruch, die ferner eine Mehrzahl von umfangsmäßig beabstandeten Fluidöffnungen (44) umfasst, die in den distalen Abschnitt (14) zusammenfallend mit dem zentralen Lumen (36) darin verlaufen.

7. Medizinische Vorrichtung nach Anspruch 6, die ferner eine Mehrzahl von umfangsmäßig beabstandeten Nuten (46) umfasst, die entlang dem distalen Abschnitt (14) von einer jeweiligen Fluidöffnung (46) in Richtung des spitzen Endes (18) verlaufen.

8. Medizinische Vorrichtung nach einem vorherigen Anspruch, wobei eines der sich verjüngenden Segmente (26 oder 28) näher am spitzen Ende (18) liegt als wenigstens ein anderes der sich verjüngenden Segmente (22 oder 24), wobei ein Aspekt (40) des einen sich verjüngenden Segments (26 oder 28) massiv ist, wobei das zentrale Lumen (36) in den distalen Abschnitt (14) bis kurz vor dem massiven Aspekt (40) verläuft.

9. Medizinische Vorrichtung nach Anspruch 8, wobei das eine sich verjüngende Segment (28) näher am spitzen Ende (18) liegt als irgendein anderes der sich verjüngenden Segmente (22, 24 oder 26), wobei das eine sich verjüngende Segment (28) völlig massiv ist und wobei das zentrale Lumen (36) in den distalen Abschnitt (14) bis kurz vor das eine sich verjüngende Segment (28) verläuft.

10. Medizinische Vorrichtung nach einem vorherigen Anspruch, wobei sich der proximale Abschnitt (12) und der distale Abschnitt (14) der stumpfen Kanüle (10) über im Wesentlichen eine gesamte Länge der Kanüle (10) verjüngen.

11. Medizinische Vorrichtung nach einem vorherigen Anspruch, wobei der distale Abschnitt (14) eine ungleichmäßige Verjüngung hat, definiert durch vier sich verjüngende Segmente, ein erstes Segment (22) neben dem proximalen Abschnitt (12), ein zweites Segment (24) neben dem ersten Segment (22), ein drittes Segment (26) neben dem zweiten Segment (24) und ein viertes Segment (28) neben dem dritten Segment (26) und näher am spitzen Ende (18) als die anderen drei Segmente (22, 24, 26).

12. Medizinische Vorrichtung nach Anspruch 11, wobei wenigstens ein Aspekt des vierten sich verjüngenden Segments (28) massiv ist.

13. Medizinische Vorrichtung nach Anspruch 12, wobei das zentrale Lumen (36) in den distalen Abschnitt (14) bis kurz vor dem massiven Aspekt des vierten sich verjüngenden Segments (28) verläuft.

14. Medizinische Vorrichtung nach Anspruch 11, wobei das vierte sich verjüngende Segment (28) massiv ist und wenigstens ein Aspekt (40) des dritten sich verjüngenden Segments (26) neben dem vierten sich verjüngenden Segment (28) massiv ist.

15. Medizinische Vorrichtung nach Anspruch 14, wobei das zentrale Lumen (36) in den distalen Abschnitt (14) bis kurz vor dem massiven Aspekt (40) des dritten sich verjüngenden Segments (26) verläuft.

16. Medizinische Vorrichtung nach einem der Ansprüche 11 bis 15, wobei das zentrale Lumen (36) durch wenigstens das erste und das zweite sich verjüngende Segment (22, 24) des distalen Abschnitts (14) verläuft.

17. Medizinische Vorrichtung nach einem der Ansprüche 11 bis 16, wobei die wenigstens eine Fluidöffnung (44) in den distalen Abschnitt (14) zusammenfallend mit dem zentralen Lumen (36) darin verläuft, aber nicht in den distalen Abschnitt (14) zusammenfallend mit dem vierten sich verjüngenden Segment

(24) oder dem spitzen Ende (18) verläuft.

18. Medizinische Vorrichtung nach einem der Ansprüche 11 bis 17, wobei sich das erste und dritte sich verjüngende Segment (22, 26) konisch verjüngen, wobei die konische Verjüngung des dritten Segments (26) größer ist als die konische Verjüngung des ersten Segments (22).

19. Medizinische Vorrichtung nach einem der Ansprüche 11 bis 18, wobei das zweite und vierte sich verjüngende Segment (24, 28) bogenförmig jeweils mit einem jeweiligen Krümmungsradius sind, wobei der Krümmungsradius der bogenförmigen Verjüngung des vierten sich verjüngenden Segments (28) kleiner ist als der Krümmungsradius der bogenförmigen Verjüngung des zweiten sich verjüngenden Segments (24).

20. Medizinische Vorrichtung nach einem vorherigen Anspruch, wobei der proximale Abschnitt (12) einen nicht kreisförmigen Querschnitt hat.

21. Medizinische Vorrichtung nach Anspruch 20, wobei der proximale Abschnitt (12) einen allgemein ovalen Querschnitt hat.

22. Medizinische Vorrichtung nach Anspruch 21, wobei sich der proximale Abschnitt (12) in Richtung des distalen Abschnitts (14) so verjüngt, dass der große Durchmesser des allgemein ovalen Querschnitts in Richtung des distalen Abschnitts abnimmt.

23. Medizinische Vorrichtung nach einem der Ansprüche 1 bis 21, wobei sich der proximale Abschnitt (12) in Richtung des distalen Abschnitts (14) verjüngt.

24. Medizinische Vorrichtung nach einem der Ansprüche 1 bis 19 in Kombination mit einem medizinischen Ort (62), mit einem Gehäuse (102) mit einem Strömungspfad (54) und einer Scheidewand (50), die einen Abschnitt des Strömungspfads begrenzt, wobei sich in der Scheidewand ein Schlitz (52) befindet, wobei die stumpfe Kanüle (10) durch den Schlitz (52) in die Scheidewand (50) eingeführt werden kann, wobei der proximale Abschnitt (12) einen nicht kreisförmigen Querschnitt hat, der einen größeren Durchmesser definiert, und der Schlitz (52) in der Scheidewand (50) so orientiert ist, dass der größere Durchmesser des proximalen Abschnitts (12) im Wesentlichen mit dem Schlitz (52) fluchtet, wenn der proximale Abschnitt (12) in der Scheidewand (50) angeordnet ist.

25. Medizinische Vorrichtung nach Anspruch 24, wobei der proximale Abschnitt (12) einen ovalen Querschnitt hat.

26. Medizinische Vorrichtung nach einem der Ansprüche 21, 24 und 25, wobei sich der proximale Abschnitt (12) entlang wenigstens dem großen Durchmesser verjüngt.

27. Medizinische Vorrichtung nach einem der Ansprüche 20 bis 22 und 24 bis 26, die ferner eine Platte (64) mit einer Oberfläche (66) und einer Unterfläche (70) und gegenüberliegend angeordneten Seitenrändern (72, 74) dazwischen umfasst, wobei der proximale Abschnitt (12) der stumpfen Kanüle (10) mit der Unterfläche (66) assoziiert ist und wobei ein Paar Führungswände (76, 78) von den gegenüberliegend angeordneten Rändern (72, 74) zu beiden Seiten der stumpfen Kanüle (10) verlaufen.

28. Medizinische Vorrichtung nach Anspruch 27, wobei die Führungswände (76, 78) in das Gehäuse (102) des medizinischen Orts (62) so eingreifen, dass der große Durchmesser der stumpfen Kanüle (10) im Wesentlichen mit dem Schlitz (52) in der Scheidewand (50) fluchtet.

29. Medizinische Vorrichtung nach einem der Ansprüche 1 bis 19, die ferner einen Adapter (60) mit einer Platte (64) mit einer Ober- und Unterfläche (66, 70) und gegenüberliegend angeordneten Seitenrändern (72, 74) dazwischen umfasst, wobei die stumpfe Kanüle (10) mit der Unterfläche (66) assoziiert ist, wobei sich der proximale Abschnitt (12) von der Plattenunterfläche (66) erstreckt und in Kombination mit einem medizinischen Ort (62) ein Gehäuse (102) mit einem Strömungspfad (54) und einer Scheidewand (50) umfasst, die einen Abschnitt des Strömungspfads begrenzt, wobei die stumpfe Kanüle (10) durch die Scheidewand (50) eingeführt werden kann, wobei der Adapter (60) auch ein Paar allgemein flache Führungswände (76, 78) hat, die von den Plattenseitenrändern (72, 74) zu beiden Seiten der stumpfen Kanüle (10) verlaufen, wobei wenigstens eine der Führungswände (76 oder 78) einen seitlichen Rand (85) mit einer Rippe (86) aufweist, die daran entlang verläuft und auf die stumpfe Kanüle (10) gerichtet ist, wobei das Gehäuse (102) ein Paar gegenüberliegende, allgemein flache Seitenwände (140) hat, wobei wenigstens eine der Seitenwände (140) einen seitlichen Rand (142) hat, der einen Nutenrand definiert, der daran entlang verläuft und so orientiert ist, dass die Rippe (86) in den Nutenrand (142) eingreift, wenn die stumpfe Kanüle (10) in der Scheidewand (50) angeordnet ist.

30. Medizinische Vorrichtung nach einem der Ansprüche 1 bis 23 in Kombination mit einem medizinischen Ort (62) mit einer geschlitzten Scheidewand (50) zum Aufnehmen der stumpfen Kanüle (10) dadurch.

31. Medizinische Vorrichtung nach einem der Ansprü-

che 1 bis 23 und 30, die ferner eine Platte (64) mit einer Oberfläche (66) und einer Unterfläche (70) und gegenüberliegend angeordneten Seitenrändern (72, 74) dazwischen umfasst, wobei eine Luer-Paarungsstruktur (68) mit der Plattenoberfläche (66) assoziiert ist, wobei der proximale Abschnitt (12) der stumpfen Kanüle (10) mit der Unterfläche (70) assoziiert ist und wobei ein Paar Führungswände (76, 78) von den gegenüberliegend angeordneten Rändern (72, 74) zu beiden Seiten der stumpfen Kanüle (10) verlaufen.

32. Medizinische Vorrichtung nach Anspruch 31, wobei die Führungswände (76, 78) seitliche Ränder (85) haben.

33. Medizinische Vorrichtung nach einem der Ansprüche 24 bis 30, wobei der medizinische Ort ein Probenort (62) ist.

34. Medizinische Vorrichtung nach Anspruch 29 oder Anspruch 32, wobei die Platte (64) Zwischenränder (92, 94) zwischen den Seitenrändern (72, 74) hat, wobei wenigstens einer der seitlichen Ränder (85) von einer der Führungswände (76) in einen Bereich (90) unterhalb von wenigstens einem der Zwischenränder (92) verläuft.

35. Medizinische Vorrichtung nach Anspruch 34, wobei wenigstens einer der seitlichen Ränder (85) der anderen Führungswand (78) in den Bereich (90) verläuft und einen Spalt (96) zwischen den seitlichen Rändern (85) definiert.

36. Medizinische Vorrichtung nach Anspruch 34 oder Anspruch 35, wobei der andere seitliche Rand (85) der einen Führungswand (76) in einen anderen Bereich (90) unterhalb des anderen der Zwischenränder (94) verläuft.

37. Medizinische Vorrichtung nach Anspruch 36, wobei der andere seitliche Rand (85) der anderen Führungswand (78) in den anderen Bereich (90) verläuft und einen Spalt (96) zwischen den anderen seitlichen Rändern (85) definiert.

38. Medizinische Vorrichtung nach einem der Ansprüche 29, 32 und 34, die eine Rippe (86) umfasst, die entlang wenigstens einem der seitlichen Ränder (85) verläuft.

39. Medizinische Vorrichtung nach Anspruch 38, wobei die Rippe (86) auf die stumpfe Kanüle (10) gerichtet ist.

40. Medizinische Vorrichtung nach einem der Ansprüche 1 bis 23 und 30 und Anspruch 35 in Abhängigkeit von Anspruch 30, die ferner eine Platte (64) mit Ober- und Unterflächen (66, 70) umfasst, wobei die Platte (64) vier Ecken hat, wobei eine Luer-Paarungsstruktur (68) mit der Plattenoberfläche (66) assoziiert ist, wobei sich der proximale Abschnitt (12) der stumpfen Kanüle von der Plattenunterfläche (70) erstreckt, wobei vier Rippen (86) von der Plattenunterfläche (66) allgemein parallel zur stumpfen Kanüle (10) verlaufen, jede assoziiert mit einer jeweiligen einen der vier Ecken der Platte (64) und jede auf die stumpfe Kanüle (10) gerichtet.

41. Medizinische Vorrichtung nach einem der Ansprüche 29 und 38 bis 40, wobei jede Rippe (86) entlang einer Radialen einer Mittellinie der stumpfen Kanüle (10) verläuft.

42. Medizinische Vorrichtung nach einem der Ansprüche 1 bis 23 in Kombination mit einem medizinischen Ort, umfassend ein Gehäuse (102) mit einem Strömungspfad (54) und einer Scheidewand (50), die einen Abschnitt des Strömungspfads begrenzt, und einem Paar beabstandeter Tragwände (122), die mit dem Gehäuse (102) gekoppelt und so konfiguriert sind, dass das Gehäuse zwischen den Tragwänden angeordnet ist, um einen Spalt dazwischen zu definieren, wobei jede Tragwand (122) einen länglichen flachen Abschnitt (124) aufweist, der in einer Richtung rittlings auf dem Gehäuse verläuft, so dass eine Innenfläche (130) davon das Gehäuse (102) konfrontiert und eine Außenfläche (136) davon von dem Gehäuse (102) weg weist, und wenigstens einen länglichen Grat (138), der auf der Außenfläche (136) von wenigstens einer der Tragwände zum Ergreifen der Stelle angeordnet ist, wobei der längliche Grat (138) entlang einer Linie in derselben Richtung verläuft wie der flache Abschnitt (124) der Tragwand (122).

43. Medizinischer Ort nach Anspruch 42, wobei jede der Tragwände (122) mehrere der genannten länglichen Graten (138) aufweist.

Revendications

1. Dispositif médical sous forme de canule à bout arrondi (10) comprenant un élément tubulaire allongé, l'élément ayant une partie proximale (12) s'étendant distalement depuis une extrémité proximale (30) et une partie distate (14) s'étendant distalement depuis la partie proximale (12) et se terminant en un bout arrondi (18), une lumière centrale (36) s'étendant à travers la partie proximale (12) et jusque dans la partie distale (14), et au moins une ouverture à fluide (44) communiquant par un aspect (48) de la partie distale (14) avec la lumière centrale (36), **caractérisé en ce que** la partie distale (14) présente un effilement non uniforme proximal au bout (18) défini

par une pluralité de segments effilés (22, 24, 26 et/ou 28) situés proximalement au bout arrondi et ayant différents effilements, les segments de la pluralité de segments effilés étant chacun progressivement plus proches du bout arrondi (18) et étant chacun adjacents et contigus à au moins un autre segment, au moins l'un des segments effilés (22 ou 26) ayant un effilement conique et au moins un autre des segments effilés (24 ou 28) ayant un effilement arqué.

2. Dispositif médical selon la revendication 1 comprenant en outre au moins une rainure (46) s'étendant le long de la partie distale (14) entre l'ouverture à fluide (44) et le bout (18).

3. Dispositif médical selon la revendication 1 ou la revendication 2, le bout (18) étant solide.

4. Dispositif médical selon la revendication 3, la lumière centrale (36) s'étendant jusque dans la partie distale (14) s'arrêtant avant le bout (18).

5. Dispositif médical selon la revendication 2, ou l'une ou l'autre des revendications 3 et 4 dépendantes de la revendication 2, l'au moins une rainure (44) s'arrêtant avant le bout (18).

6. Dispositif médical selon l'une quelconque des revendications précédentes comprenant en outre une pluralité d'ouvertures à fluide espacées circonférentiellement (44) s'étendant jusque dans la partie distale (14) coïncidant avec la lumière centrale (36) à l'intérieur de celle-ci.

7. Dispositif médical selon la revendication 6 comprenant en outre une pluralité de rainures espacées circonférentiellement (46) s'étendant le long de la partie distale (14) depuis une ouverture à fluide (46) respective vers le bout (18).

8. Dispositif médical selon l'une quelconque des revendications précédentes, l'un des segments effilés (26 ou 28) étant plus proche du bout (18) qu'au moins un autre des segments effilés (22 ou 24), un aspect (40) de ce segment effilé (26 ou 28) étant solide, la lumière centrale (36) s'étendant jusque dans la partie distale (14) et s'arrêtant avant l'aspect solide (40).

9. Dispositif médical selon la revendication 8, ce segment effilé (28) étant plus proche du bout (18) que tout autre des segments effilés (22, 24, ou 26), ce segment effilé (28) étant complètement solide, la lumière centrale (36) s'étendant jusque dans la partie distale (14) et s'arrêtant avant ce segment effilé (28).

10. Dispositif médical selon l'une quelconque des revendications précédentes, dans lequel la partie proximale (12) et la partie distale (14) de la canule à bout arrondi (10) sont effilées le long de sensiblement toute une longueur de la canule (10).

11. Dispositif médical selon l'une quelconque des revendications précédentes, la partie distale (14) ayant un effilement non uniforme défini par quatre segments effilés, un premier segment (22) adjacent à la partie proximale (12), un deuxième segment (24) adjacent au premier segment (22), un troisième segment (26) adjacent au deuxième segment (24), et un quatrième segment (28) adjacent au troisième segment (26) et plus proche du bout (18) que les trois autres segments (22, 24, 26).

12. Dispositif médical selon la revendication 11, au moins un aspect du quatrième segment effilé (28) étant solide.

13. Dispositif médical selon la revendication 12, la lumière centrale (36) s'étendant jusque dans la partie distale (14) s'arrêtant avant l'aspect solide du quatrième segment effilé (28).

14. Dispositif médical selon la revendication 11, le quatrième segment effilé (28) étant solide et au moins un aspect (40) du troisième segment effilé (26) adjacent au quatrième segment effilé (28) étant solide.

15. Dispositif médical selon la revendication 14, la lumière centrale (36) s'étendant jusque dans la partie distale (14) s'arrêtant avant l'aspect solide (40) du troisième segment effilé (26).

16. Dispositif médical selon l'une quelconque des revendications 11 à 15, la lumière centrale (36) s'étendant à travers au moins les premier et deuxième segments effilés (22, 24) de la partie distale (14).

17. Dispositif médical selon l'une quelconque des revendications 11 à 16, l'au moins une ouverture pour fluide (44) s'étendant jusque dans la partie distale (14) coïncidant avec la lumière centrale (36) à l'intérieur de celle-ci mais ne s'étendant pas jusque dans la partie distale (14) coïncidant avec le quatrième segment effilé (24) ou le bout (18).

18. Dispositif médical selon l'une quelconque des revendications 11 à 17, les premier et troisième segments effilés (22, 26) étant effilés coniquement, l'effilement conique du troisième segment (26) étant supérieur à l'effilement conique du premier segment (22).

19. Dispositif médical selon l'une quelconque des revendications 11 à 18, les deuxième et quatrième segments effilés (24, 28) étant arqués chacun avec un rayon de courbure respectif, le rayon de courbure de l'effilement arqué du quatrième segment effilé (28) étant inférieur au rayon de courbure de l'effile-

ment arqué du deuxième segment effilé (24).

20. Dispositif médical selon l'une quelconque des revendications précédentes, la partie proximale (12) ayant une coupe transversale non circulaire.

21. Dispositif médical selon la revendication 20, la partie proximale (12) ayant une coupe transversale généralement ovale.

22. Dispositif médical selon la revendication 21, la partie proximale (12) s'effilant vers la partie distale (14) de telle sorte que le diamètre principal de la section généralement ovale diminue vers la partie distale.

23. Dispositif médical selon l'une quelconque des revendications 1 à 21, la partie proximale (12) s'effilant vers la partie distale (14).

24. Dispositif médical selon l'une quelconque des revendications 1 à 19 en combinaison avec un site médical (62) comportant un logement (102) présentant un chemin d'écoulement (54), et une membrane (50) bornant une partie du chemin d'écoulement, la membrane présentant une fente (52) à l'intérieur, la canule à bout arrondi (10) pouvant être insérée à travers la fente (52) dans la membrane (50), dans lequel la partie proximale (12) présente une coupe transversale non circulaire qui définit un diamètre principal et la fente (52) dans la membrane (50) est orientée de telle sorte que le diamètre principal de la partie proximale (12) soit sensiblement aligné avec la fente (52) quand la partie proximale (12) est disposée dans la membrane (50).

25. Dispositif médical selon la revendication 24, la partie proximale (12) étant une coupe transversale ovale.

26. Dispositif médical selon l'une quelconque des revendications 21, 24 et 25, la partie proximale (12) s'effilant au moins le long du diamètre principal.

27. Dispositif médical selon l'une quelconque des revendications 20 à 22 et 24 à 26 comprenant en outre une plaque (64) présentant une surface supérieure (66) et une surface inférieure (70) et des bords latéraux disposés en opposition (72, 74) entre elles, la partie proximale (12) de la canule à bout arrondi (10) étant associée à la surface inférieure (66), et une paire de parois de guidage s'étendant depuis les bords disposés en opposition (72, 74) jusqu'à chaque côté de la canule à bout arrondi (10).

28. Dispositif médical selon la revendication 27, les parois de guidage (76, 78) s'emboîtant avec le logement (102) du site médical (62) de telle sorte que le diamètre principal de la canule à bout arrondi (10) soit sensiblement alignée avec la fente (52) dans la membrane (50).

29. Dispositif médical selon l'une quelconque des revendications 1 à 19, comprenant en outre un adaptateur (60) comportant une plaque (64) présentant des surfaces supérieure et inférieure (66, 70) et des bords latéraux disposés en opposition (72, 74) entre elles, la canule à bout arrondi (10) étant associée à la surface inférieure (66), la partie proximale (12) s'étendant depuis la surface inférieure de plaque (66), et en combinaison avec un site médical (62) comportant un logement (102) présentant un chemin d'écoulement (54) et une membrane (50) bornant une partie du chemin d'écoulement, la canule à bout arrondi (10) pouvant être insérée à travers la membrane (50), dans lequel l'adaptateur (60) comporte également une paire de parois de guidage généralement plates (76, 78) s'étendant depuis les bords latéraux de plaque (72, 74) jusqu'à chaque côté de la canule à bout arrondi (10), au moins l'une des parois de guidage (76 ou 78) ayant un bord latéral (85) comportant une nervure (86) courant le long de celui-ci et dirigée vers la canule à bout arrondi (10), le logement (102) comportant une paire de parois latérales généralement plates opposées (140), au moins l'une des parois latérales (140) ayant un bord latéral (142) définissant un bord de rainure courant le long de celui-ci et orienté de telle sorte que la nervure (86) s'engage le long du bord de rainure (142) quand la canule à bout arrondi (10) est disposée dans la membrane (50).

30. Dispositif médical selon l'une quelconque des revendications 1 à 23 en combinaison avec un site médical (62) comportant une membrane fendue (50) pour recevoir la canule à bout arrondi (10) à travers celle-ci.

31. Dispositif médical selon l'une quelconque des revendications 1 à 23 et 30 comprenant en outre une plaque (64) présentant une surface supérieure (66) et une surface inférieure (70) et des bords latéraux disposés en opposition (72, 74) entre elles, une structure d'accouplement luer (68) associée à la surface supérieure de plaque (66), la partie proximale (12) de la canule à bout arrondi (10) associée à la surface inférieure (70), et une paire de parois de guidage (76, 78) s'étendant depuis les bords disposés en opposition (72, 74) jusqu'à chaque côté de la canule à bout arrondi (10).

32. Dispositif médical selon la revendication 31, les parois de guidage (76, 78) ayant des bords latéraux (85).

33. Dispositif médical selon l'une quelconque des revendications 24 à 30, le site médical étant un site d'échantillon (62).

34. Dispositif médical selon la revendication 29 ou la revendication 32, la plaque (64) ayant des bords intermédiaires (92, 94) entre les bords latéraux (72, 74), au moins l'un des bords latéraux (85) de l'une des parois de guidage (76) s'étendant jusque dans une zone (90) en dessous d'au moins l'un des bords intermédiaires (92).

35. Dispositif médical selon la revendication 34, au moins l'un des bords latéraux (85) de l'autre paroi de guidage (78) s'étendant jusque dans la zone (90) et définissant un espace (96) entre les bords latéraux (85).

36. Dispositif médical selon la revendication 34 ou la revendication 35, l'autre bord latéral (85) de la paroi de guidage (76) s'étendant jusque dans une autre zone (90) en-dessous d'un autre des bords intermédiaires (94).

37. Dispositif médical selon la revendication 36, l'autre bord latéral (85) de l'autre paroi de guidage (78) s'étendant jusque dans l'autre zone (90) et définissant un espace (96) entre les autres bords latéraux (85).

38. Dispositif médical selon l'une quelconque des revendications 29, 32 et 34 comprenant en outre une nervure (86) courant au moins le long de l'un des bords latéraux (85).

39. Dispositif médical selon la revendication 38, la nervure (86) étant dirigée vers la canule à bout arrondi (10).

40. Dispositif médical selon l'une quelconque des revendications 1 à 23 et 30 et la revendication 35 dépendant de la revendication 30 comprenant en outre une plaque (64) ayant des surfaces supérieure et inférieure (66, 70), la plaque (64) ayant quatre coins, une structure d'accouplement luer (68) associée à la surface supérieure de plaque (66), la partie proximale (12) de la canule à bout arrondi s'étendant depuis la surface inférieure de plaque (70), dans lequel quatre nervures (86) s'étendent depuis la surface inférieure de plaque (66) généralement parallèlement à la canule à bout arrondi (10), chacune associée à un coin respectif des quatre coins de la plaque (64), et chacune étant dirigée vers la canule à bout arrondi (10).

41. Dispositif médical selon l'une quelconque des revendications 29 et 38 à 40, chaque nervure (86) s'étendant radialement à un axe central de la canule à bout arrondi (10).

42. Dispositif médical selon l'une quelconque des revendications 1 à 23 en combinaison avec un site médical comportant un logement (102) présentant un chemin d'écoulement (54) et une membrane (50) bornant une partie du chemin d'écoulement, et une paire de parois de support espacées (122) couplée au logement (102) et configurée de telle sorte que le logement soit disposé entre les parois de support pour définir un espace entre elles, chaque paroi de support (122) ayant une partie plate allongée (124) s'étendant dans un sens chevauchant le logement de telle sorte qu'une surface interne (130) de celle-ci fasse face au logement (102) et une surface externe (136) de celle-ci soit détournée du logement (102), et au moins une nervure allongée (138) disposée sur la surface externe (136) d'au moins l'une des parois de support pour saisir le site, la nervure allongée (138) s'étendant le long d'une ligne dans le même sens que la partie plate (124) de la paroi de support (122).

43. Dispositif médical selon la revendication 42, chacune des parois de support (122) comportant une pluralité desdites nervures allongées (138).

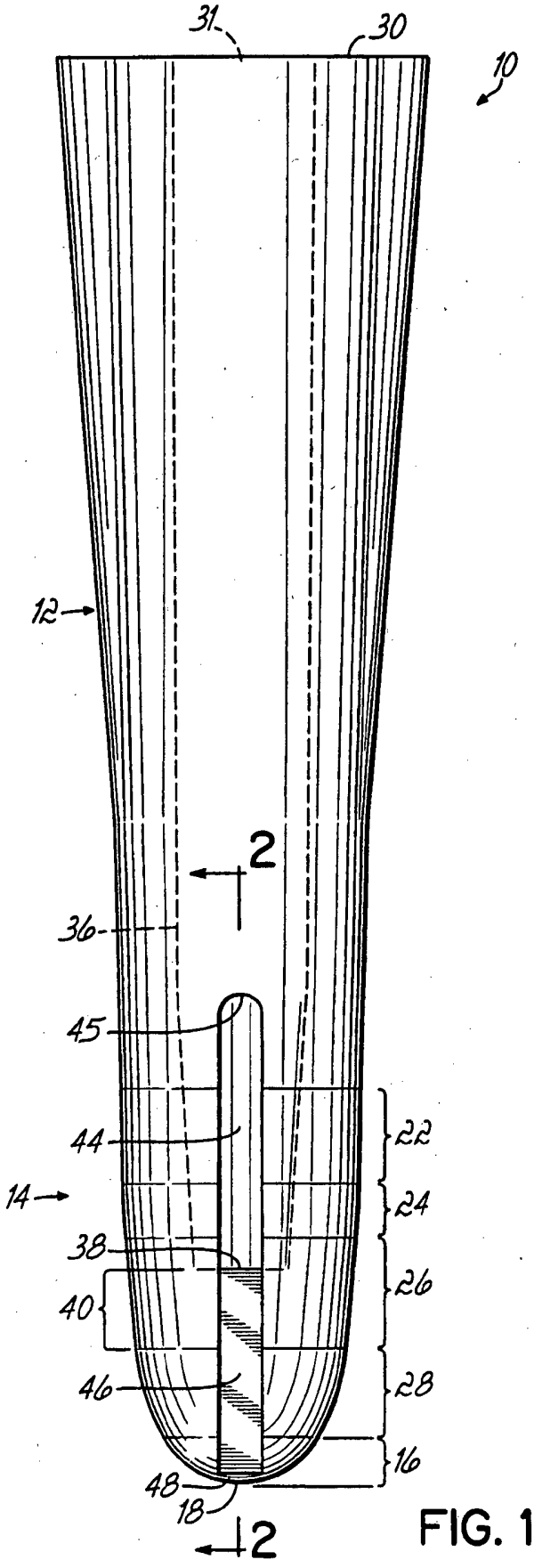
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FIG. 1

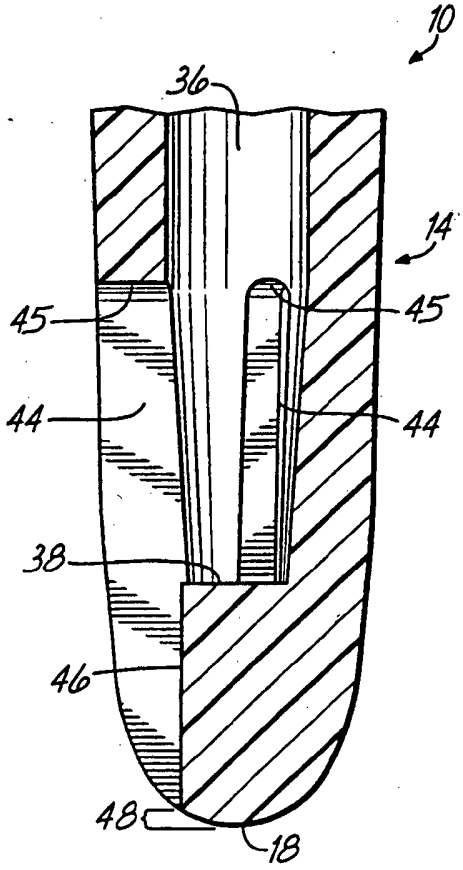
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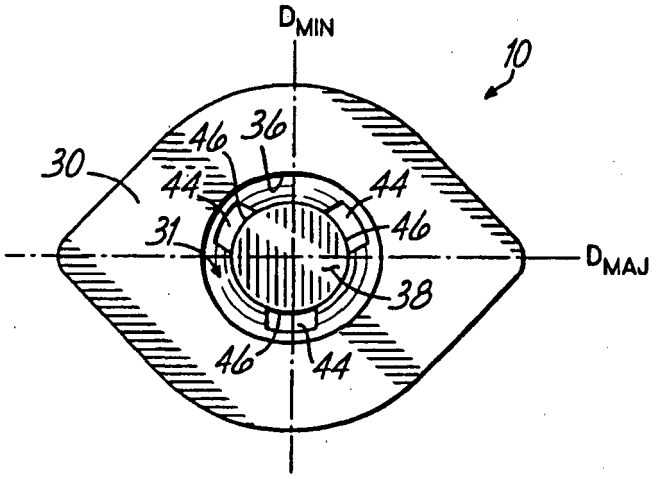
FIG. 2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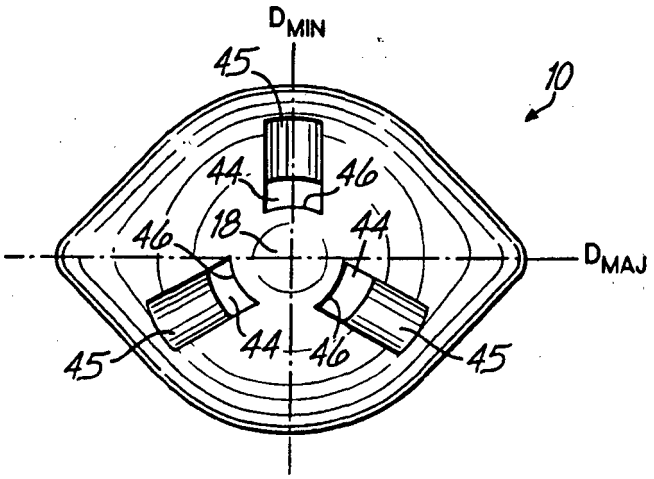
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FIG. 4

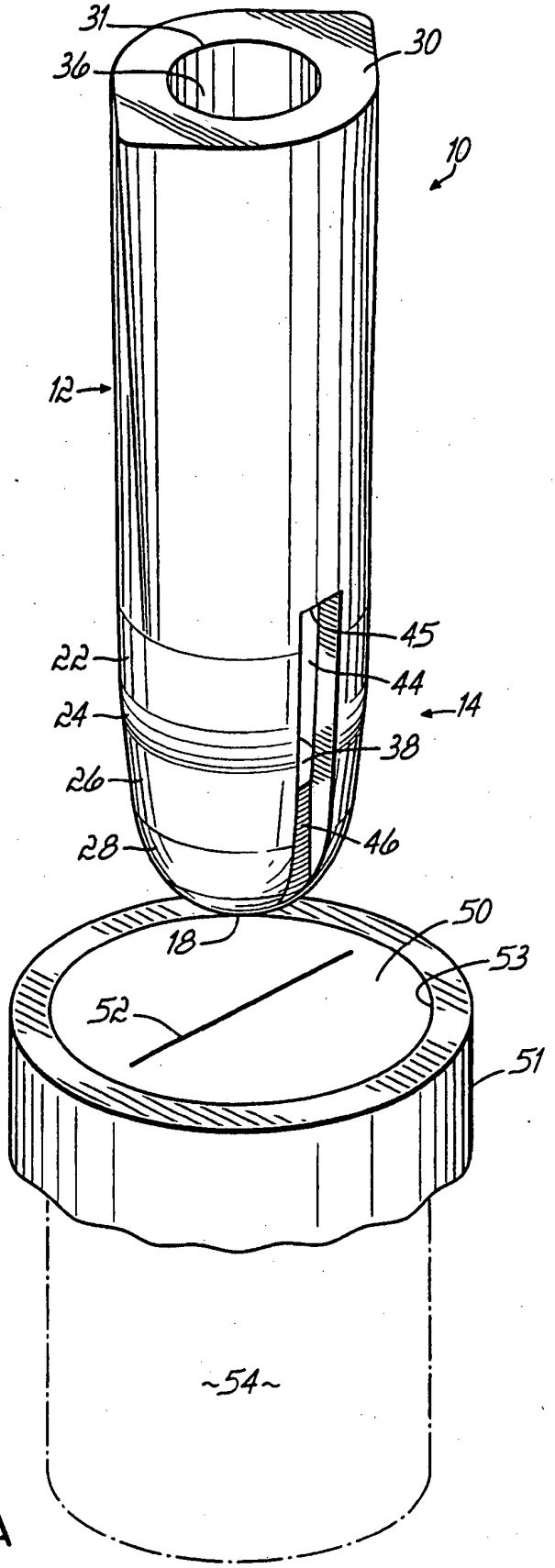

FIG. 5A

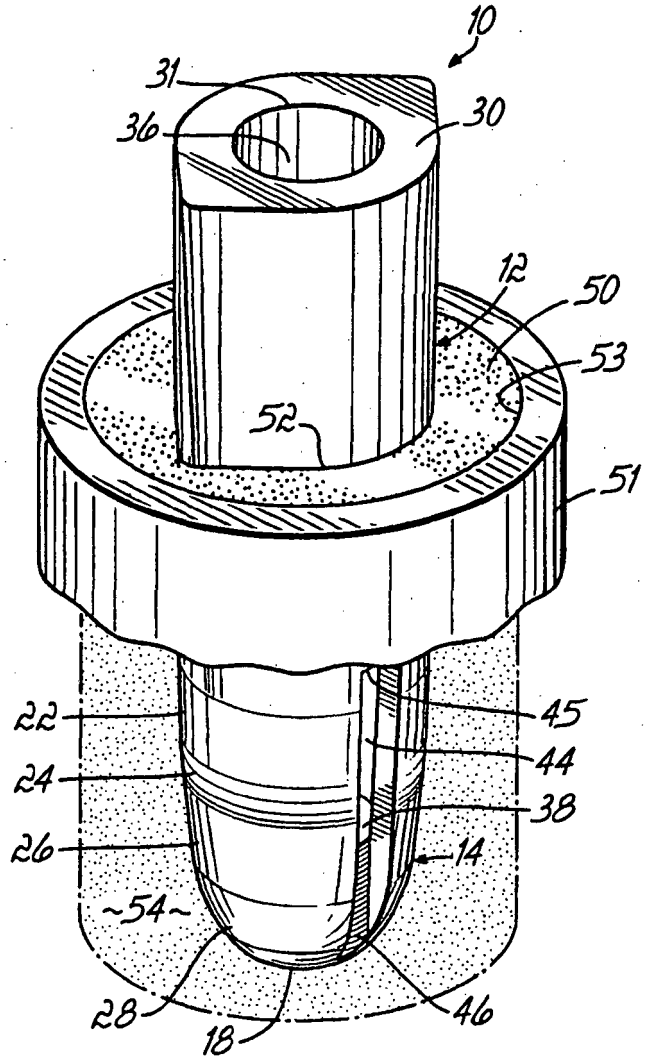

FIG. 5B

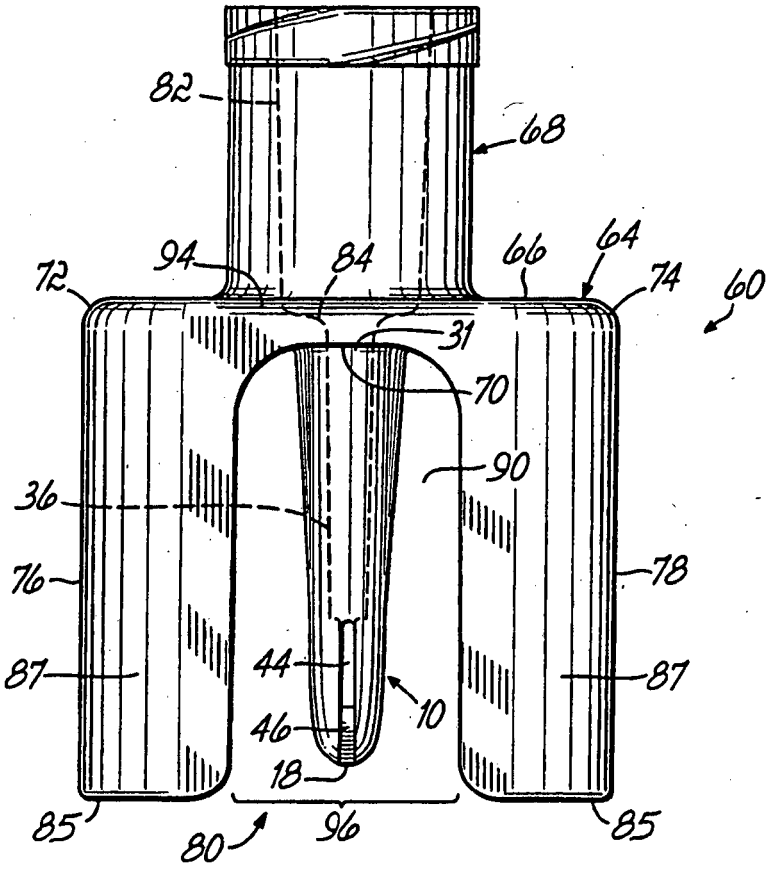
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FIG. 6

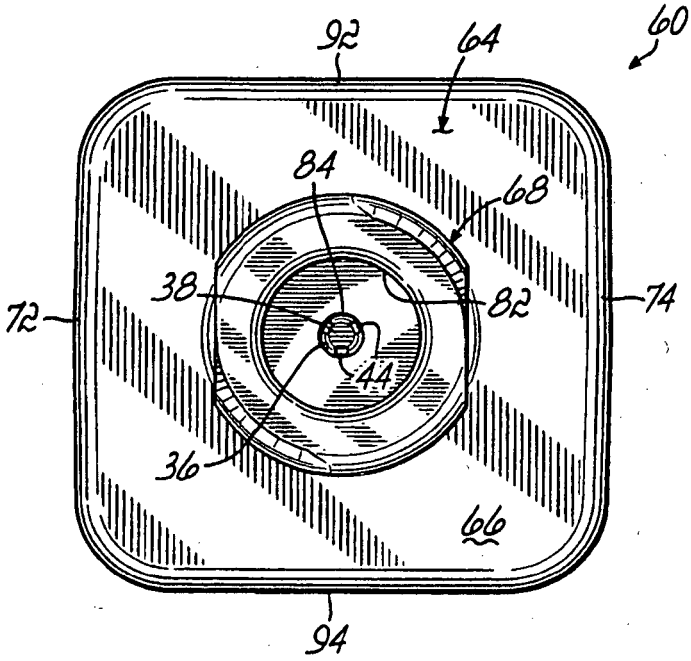
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FIG. 7

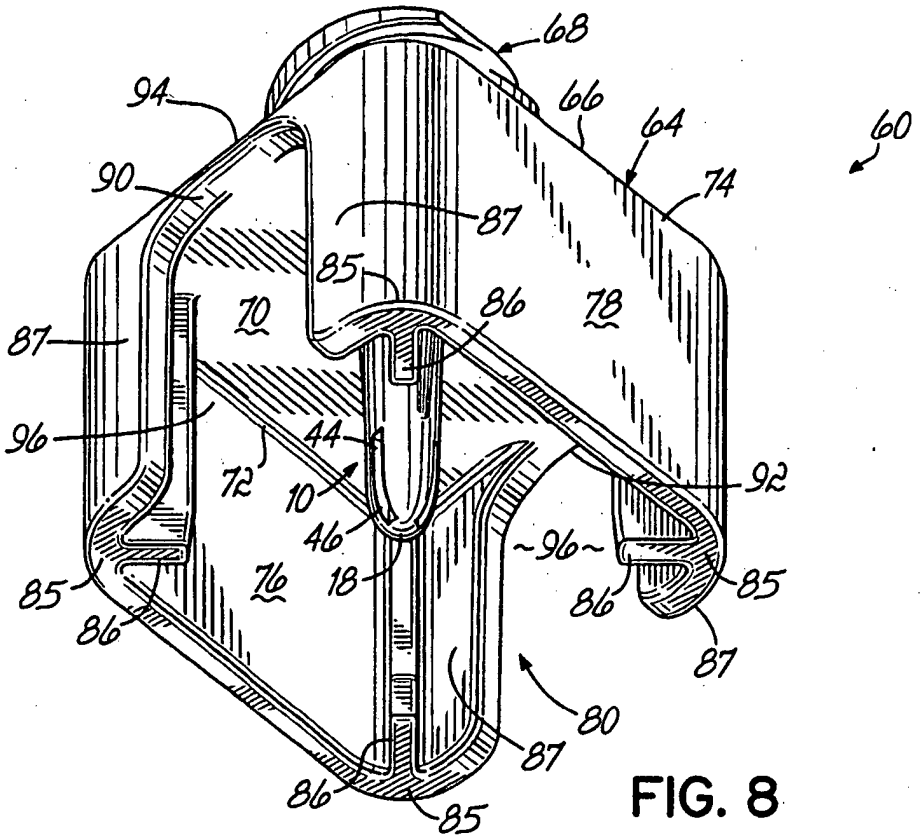
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FIG. 8

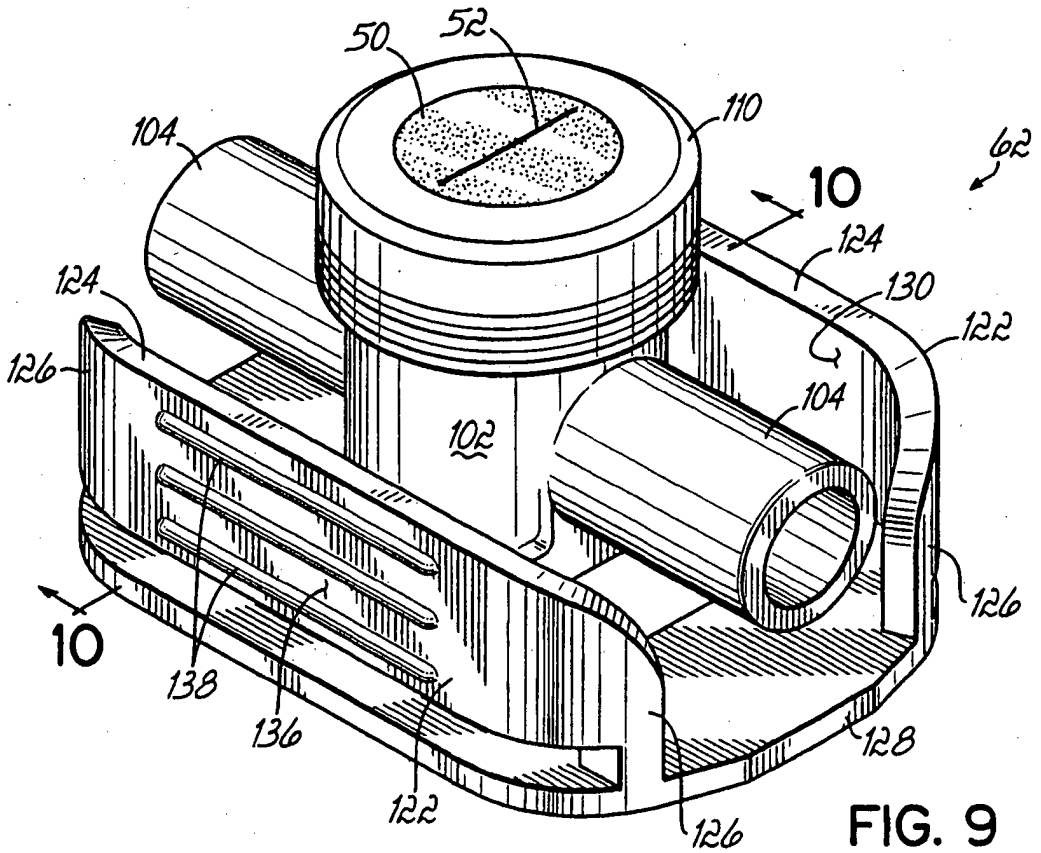
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FIG. 9

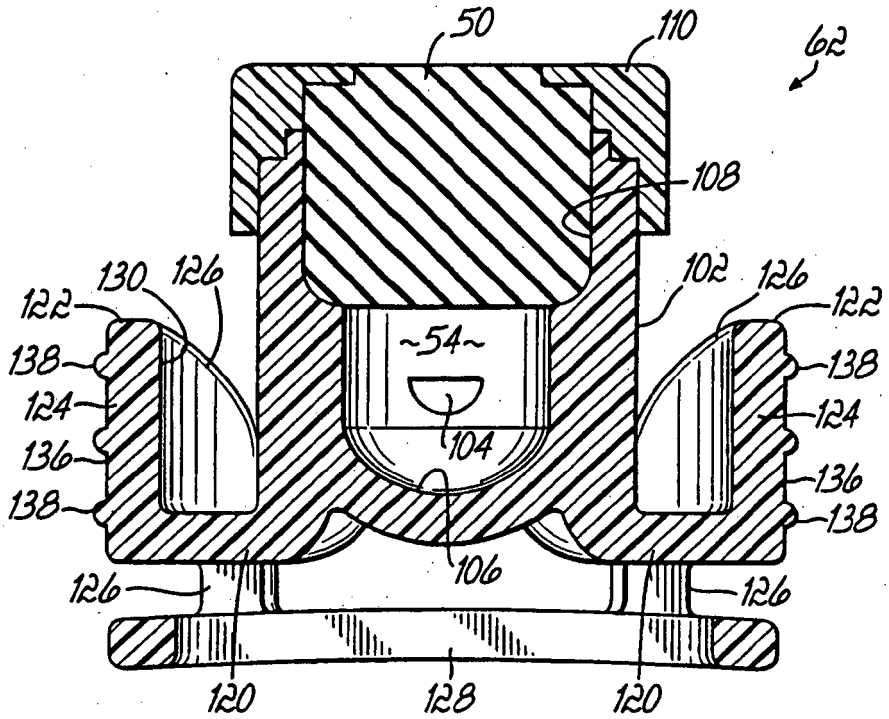
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FIG. 10

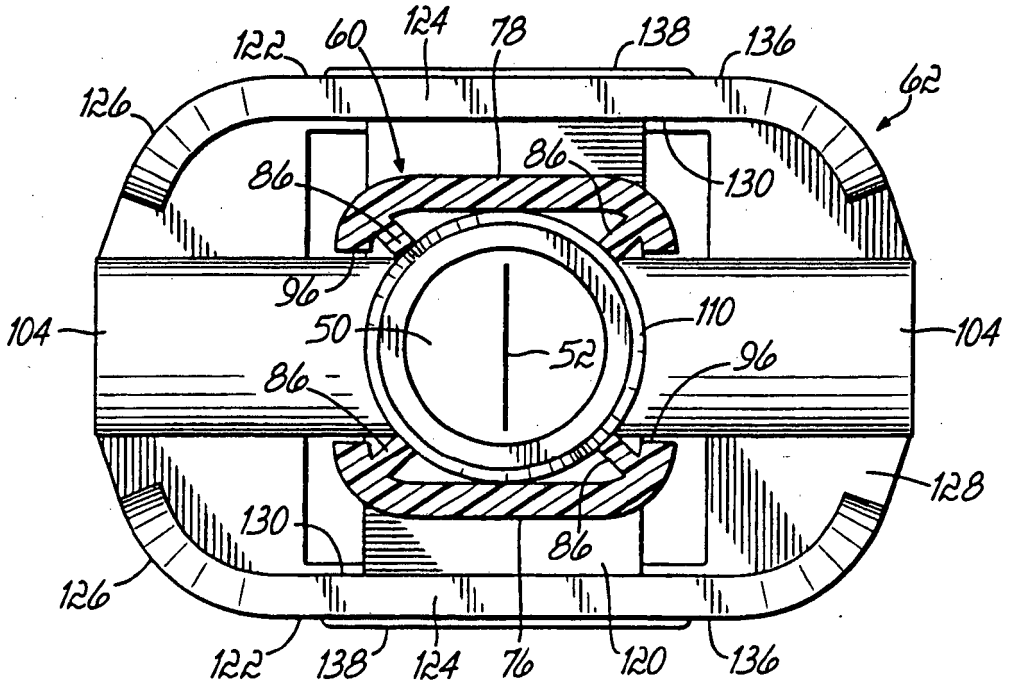
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FIG. 11

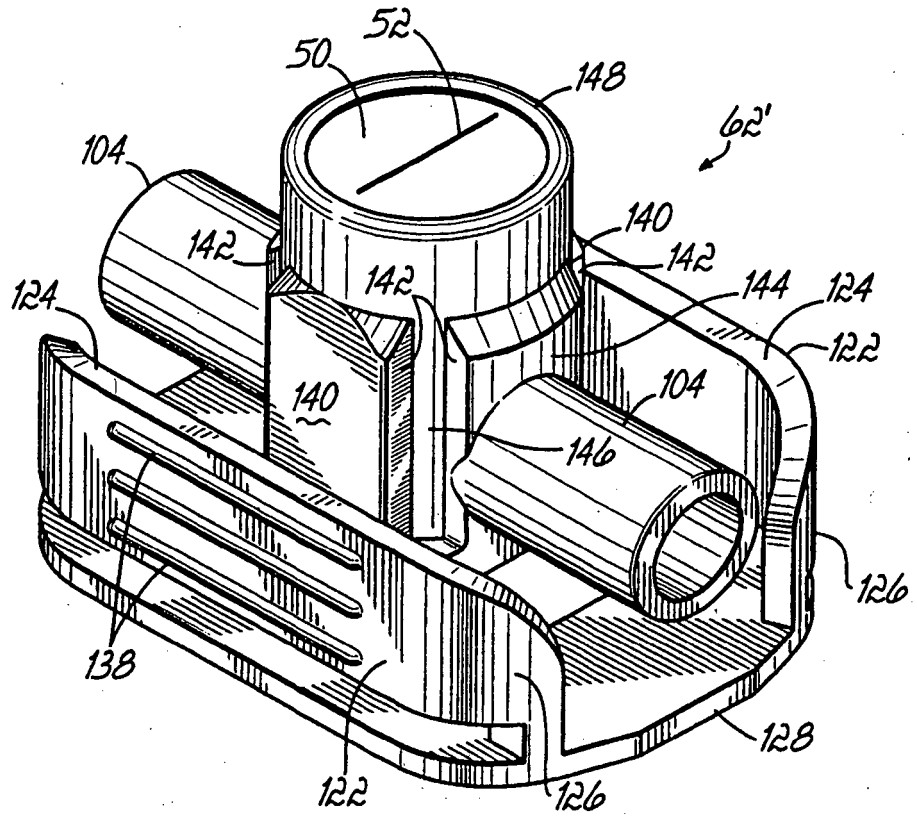
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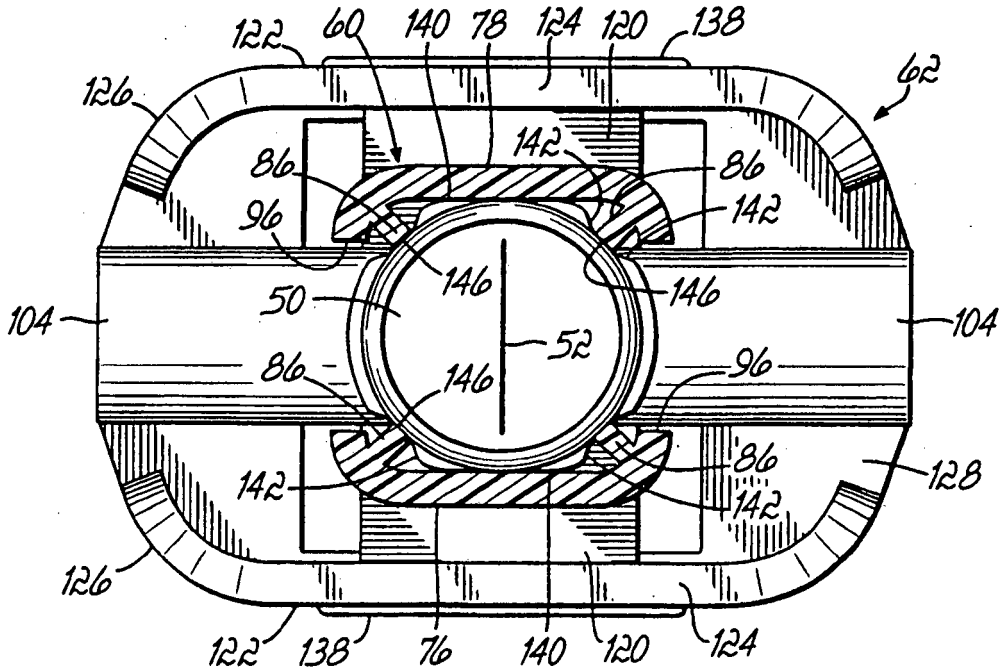
FIG. 12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124

FIG. 13

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 5135489 A **[0005]**
- WO 9119462 A **[0006]**
- US 5221271 A **[0026]**